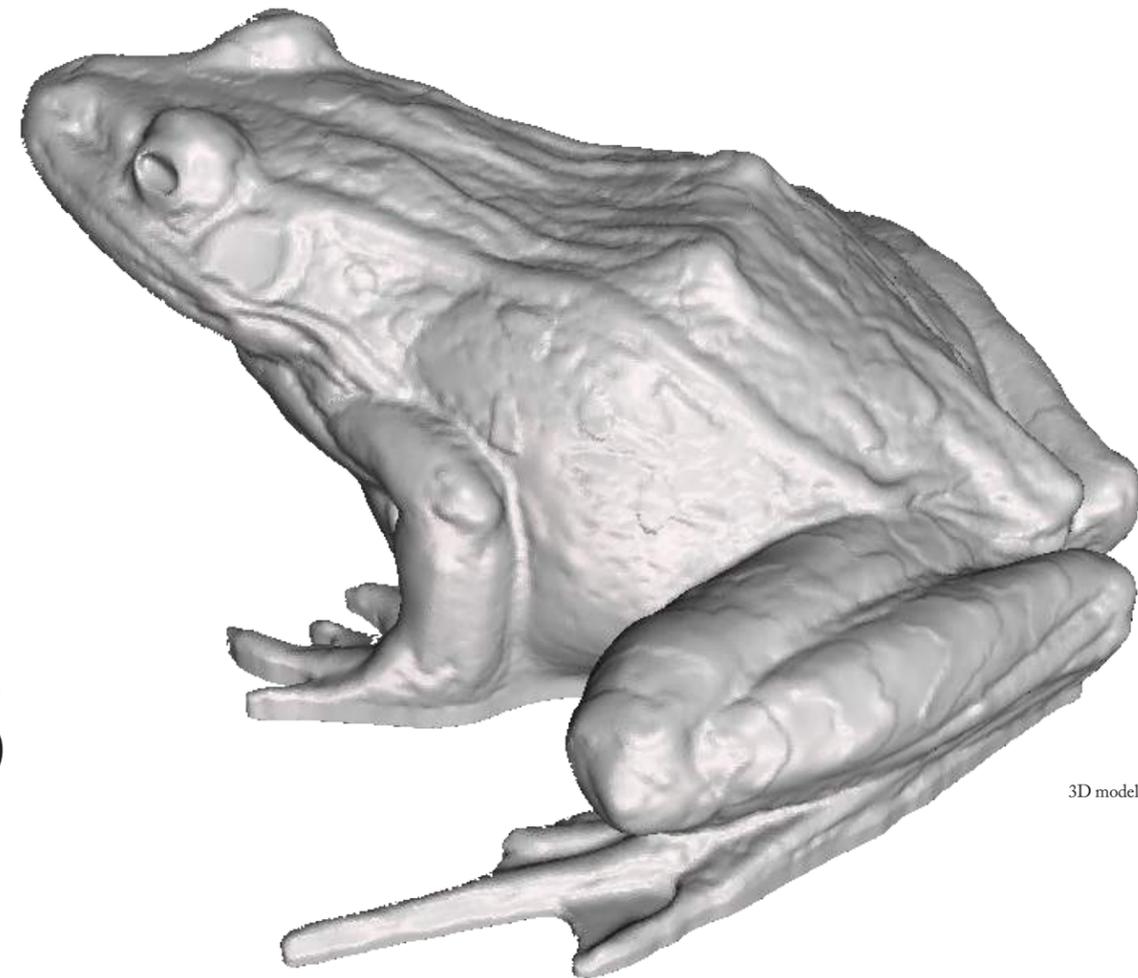


Sabine Street Promenade
Public Art Project / AIPP Austin

Final Design Review

Legge Lewis Legge

Amphibious



3D model: Rio Grande Leopard Frog

Amphibious Introduction

Amphibious

WITH THE HELP of local experts, we have determined the range of frogs and toads that either currently inhabit the riparian zones of Waller Creek or that might inhabit the creek after restoration. The result is a comprehensive list of 15 toad and frog species.

In order to create the most scientific and accurate 'physical field guide' to these species, we have partnered with Joe Morgan, the foremost amphibian model-maker in the country, to obtain plastic base models cast from life. All of Morgan's models are cast directly from legally obtained dead specimens that he preserves. Morgan Reptile Replicas supplies many scientific institutions with models, including the American Museum of Natural History in New York, and the Smithsonian Institution in Washington DC. We will laser-scan these base models and augment the resulting high resolution 3D models as needed for the purposes of creating and maintaining the exact species likenesses that we need, including surface texturing to represent skin patterns and markings.

Final 3D models will be sent to Shapeways, a professional 3D printing vendor, for full-scale prints in high resolution plastic and resin. These, in turn, will be sent on to a local foundry for traditional casting in bronze. As the samples show, this process, a combination of the latest technology and centuries-old traditional casting processes, will accurately render the beautiful and complex form and texture of the frogs and toads.

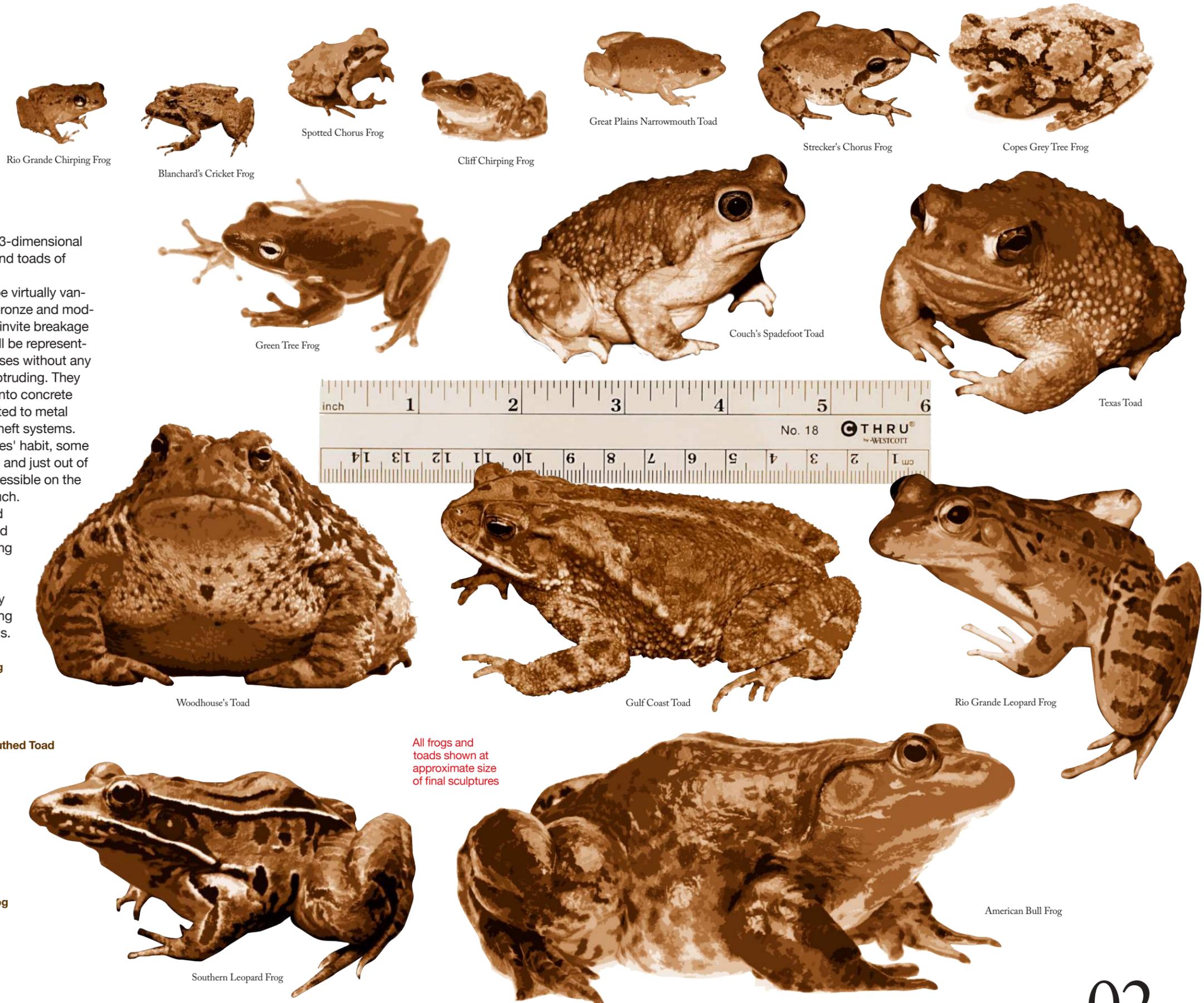
Approximately 30 life-size bronze and toad sculptures will then be permanently affixed to various locations along Sabine Street between 4th street and 6th Street,

creating an unexpected 3-dimensional field guide to the frogs and toads of Waller Creek.

The small sculptures be virtually vandal-proof, cast of solid bronze and modeled to avoid forms that invite breakage or stealing: Creatures will be represented in compact sitting poses without any thin, vulnerable parts protruding. They will be permanently set into concrete where applicable, or bolted to metal infrastructure with anti-theft systems. According to each species' habit, some may be installed high up and just out of reach, others will be accessible on the ground, encouraging touch.

A digital info sheet and map will be designed and available on line, providing information about all the species represented in *Amphibious*. Visitors may make a game of searching for all the toads and frogs.

1. Rio Grande Chirping Frog
2. Blanchard's Cricket Frog
3. Spotted Chorus Frog
4. Cliff Chirping Frog
5. Great Plains Narrow Mouthed Toad
6. Strecker's Chorus Frog
7. Cope's Gray Tree Frog
8. Green Tree Frog
9. Couch's Spadefoot Toad
10. Texas Toad
11. Woodhouse's Toad
12. Gulf Coast Toad
13. Rio Grande Leopard Frog
14. Southern Leopard Frog
15. American Bullfrog

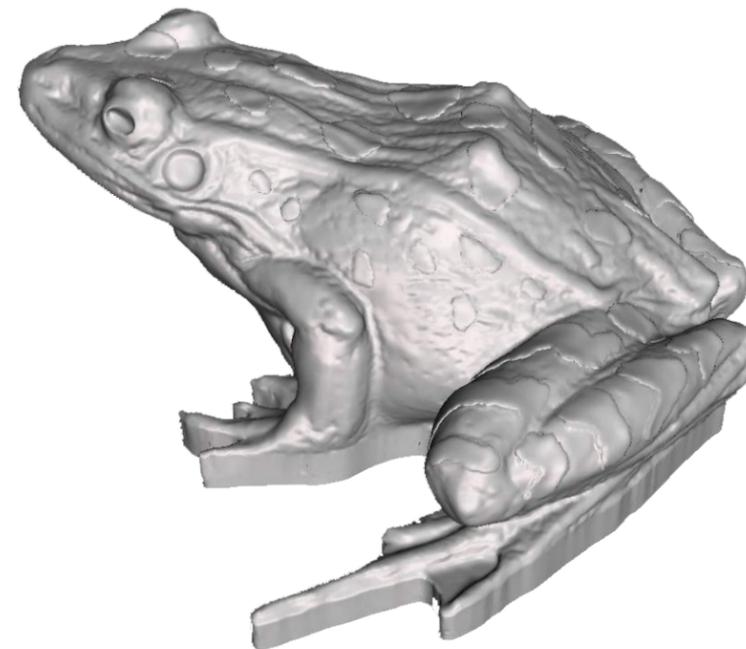
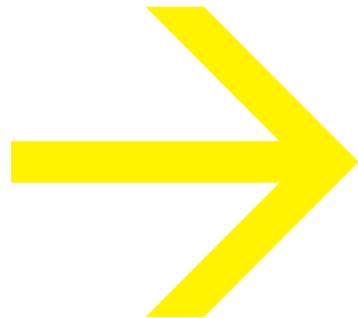
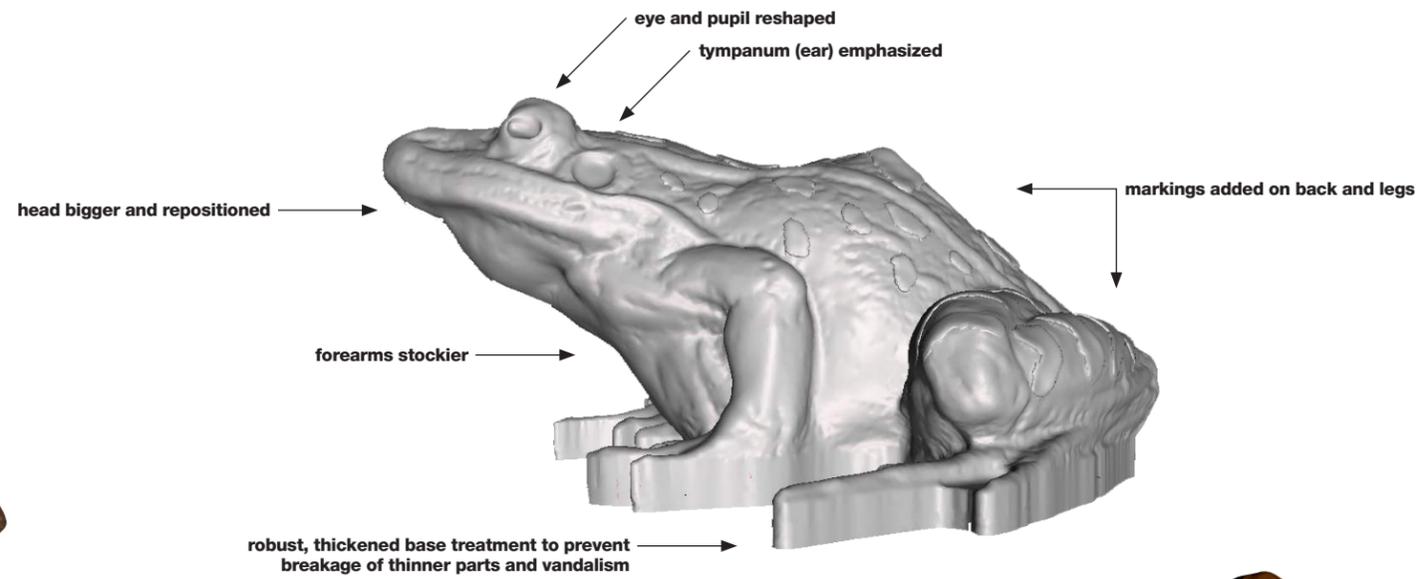


All frogs and toads shown at approximate size of final sculptures

Amphibious Base Model List

	AMPHIBIOUS Species List	individual species' actual size range	AMPHIBIOUS sculpture size	Morgan models exact match close match			
1	Rio Grande Chirping Frog	.6-1"	1.25"	MRR-166 Gray Treefrog			
2	Blanchard's Cricket Frog	.6-1.25"	1.5"	MRR-123 Southern Cricket Frog			
3	Spotted Chorus Frog	.5-1.2"	1.5"	MRR-92 Green Frog			
4	Cliff Chirping Frog	.7-1.5"	1.5"	MRR-161 Cuban Treefrog			
5	Great Plains Narrow Mouthed Toad	.8-1.6"	1.5"	MRR-160 Narrow Mouth Toad			
6	Strecker's Chorus Frog	1-1.9"	2"	MRR-95 Spring Peeper			
7	Cope's Gray Tree Frog	1.2-2.5"	2"	MRR-166 Gray Treefrog			
8	Green Tree Frog	1.2-2.5"	2"	MRR-112 Green Treefrog			
9	Couch's Spadefoot Toad	2.2-3.5"	3"	MRR-165 Couch's Spadefoot Toad			
10	Texas Toad	2-3.5"	3"	MRR-96 Fowler's Toad			
11	Woodhouse's Toad	2-5"	4"	MRR-163 Woodhouse Toad			
12	Gulf Coast Toad	2-5.5"	4"	MRR-149 Gulf Coast Toad			
13	Rio Grande Leopard Frog	2.2-4.5"	4"	MRR-93 Leopard Frog			
14	Southern Leopard Frog	2-5"	4"	MRR-93 Leopard Frog			
15	American Bullfrog	3.5-8"	6"	MRR-1 Bullfrog			

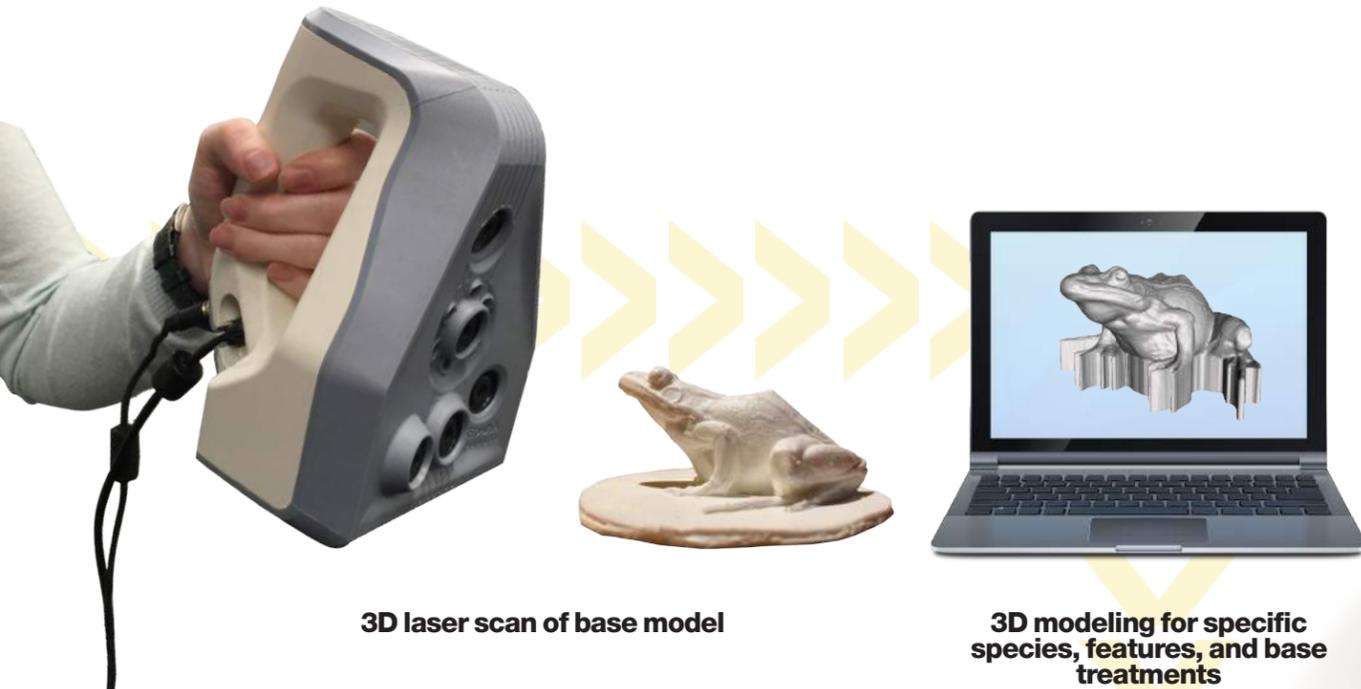
Amphibious Digital Modeling



Original base model (cast resin): *Leopard Frog*

3D digital model: *Rio Grande Leopard Frog*

Amphibious Production: 3D Printing & Traditional Bronze Casting

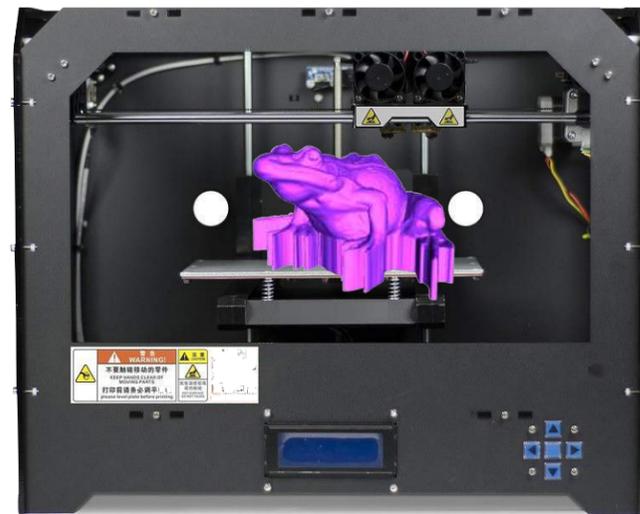


Small frog 3D print test
 .75-inch-long frog in solid 3D printed bronze

3D printing combined with traditional bronze casting method:

All frogs and toads will start as base models and be laser scanned and remodeled using 3D modeling software. Once modeled to reflect each specific species, High resolution 3D prints will be made and sent to a foundry where all toads and frogs will be cast in bronze and finished with attachment hardware.

NOTE: 1 3D printed creature in 'matte finish bronze' stainless steel and 1 3D printed creature in solid bronze will be produced and installed. These 2 little sculptures will represent one of the first instances of 3D printed permanent public art, providing valuable research going forward into the viability of 3D printed materials installed in the public realm.



3D-print in high resolution acrylate or plastic



traditional rubber mold made from 3D-printed high resolution acrylate or plastic print



frog cast in wax from rubber mold

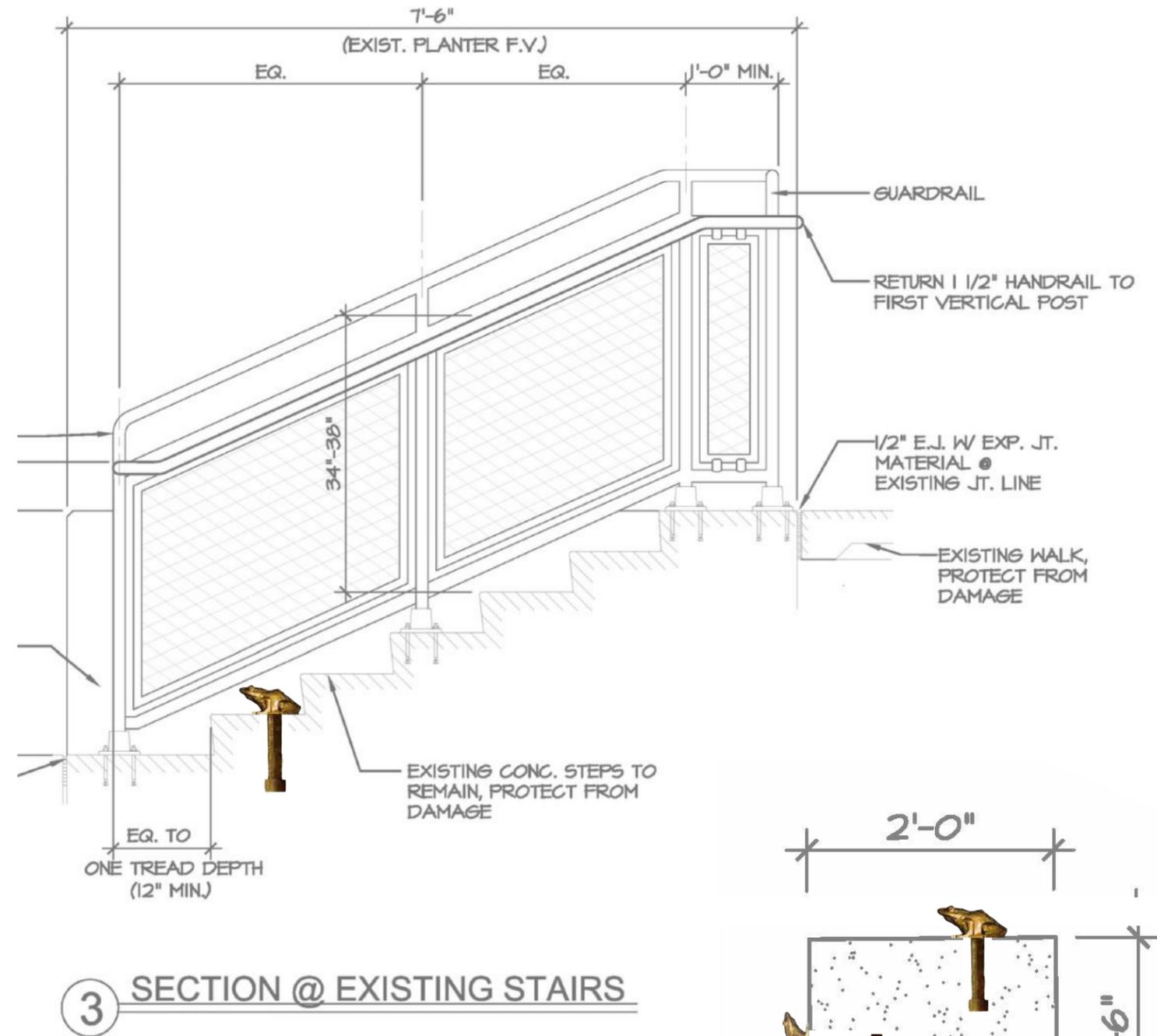
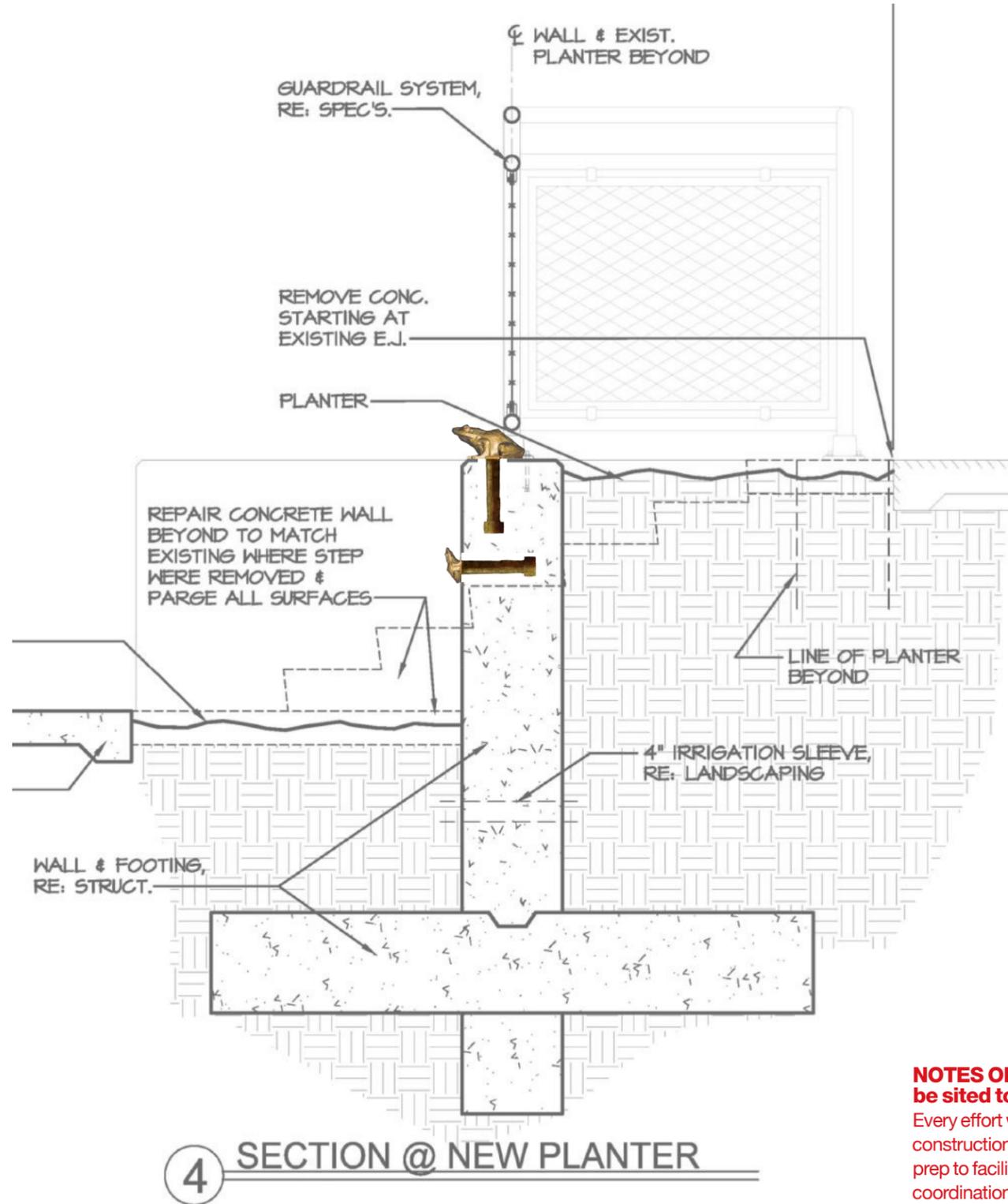


traditional fireproof mold made from cast wax model using lost wax method

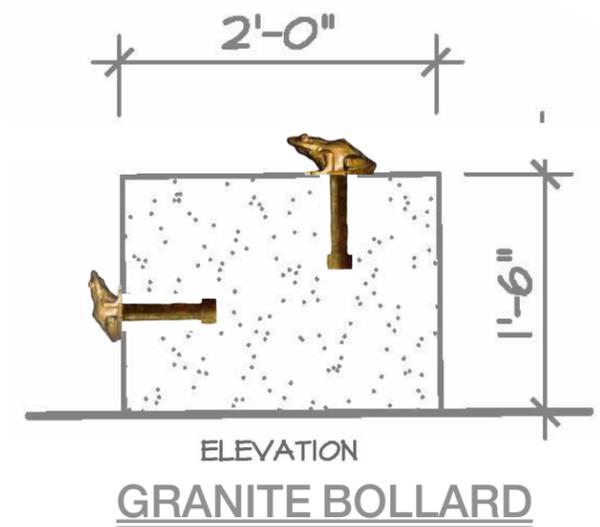


bronze cast from fireproof mold

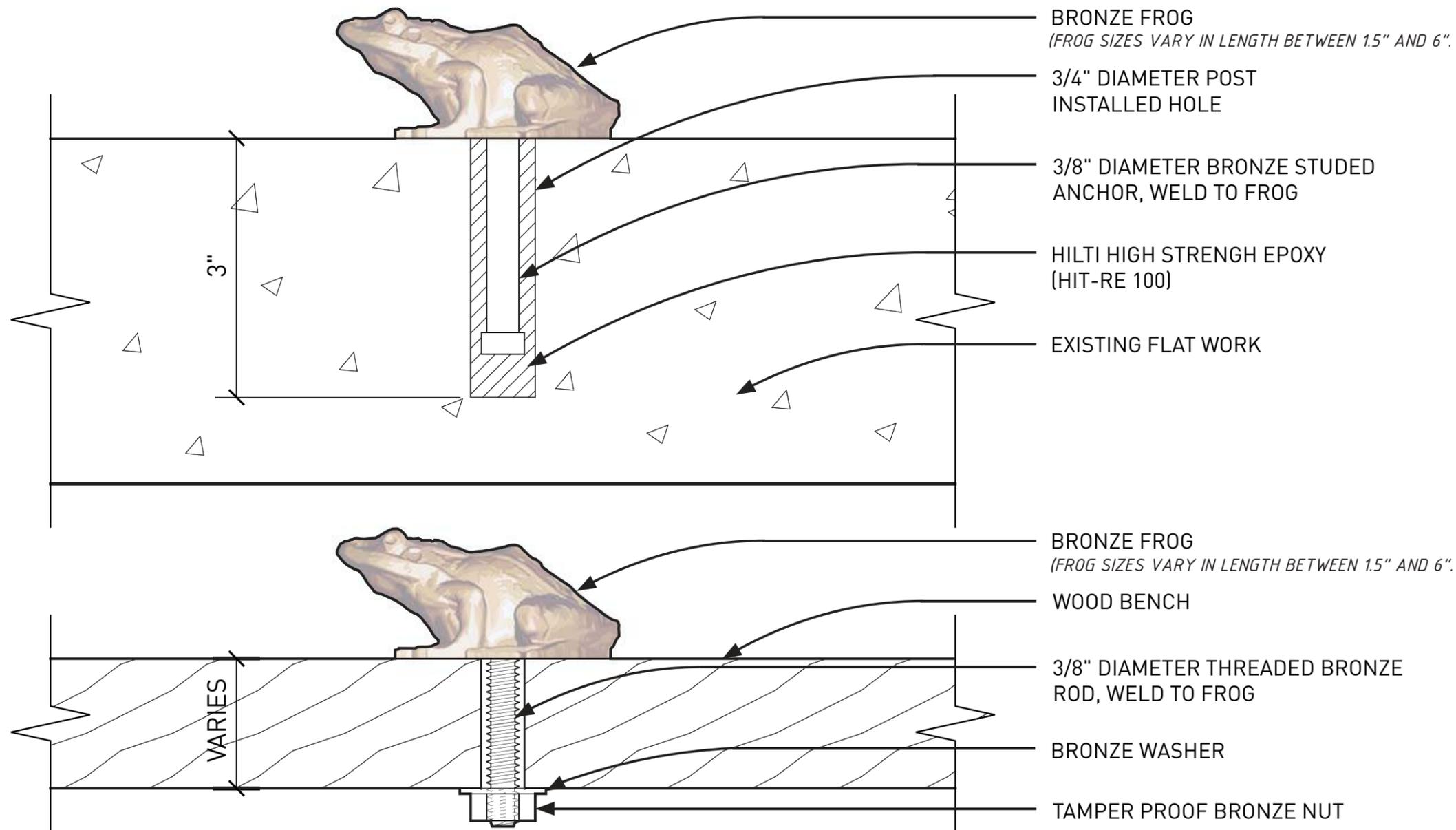
Amphibious Installation: Attachment Sites & Strategies



NOTES ON INSTALLATION: Sculptures will be sited to avoid any tripping hazards. Every effort will be made to post-install sculptures (after construction is finished). However, some sites may require prep to facilitate sculpture installation, in which case(s) coordination with contractor will be necessary.



Amphibious Installation: Attachment Detail Drawings



10/5/2016

FROG SECTION DETAILS

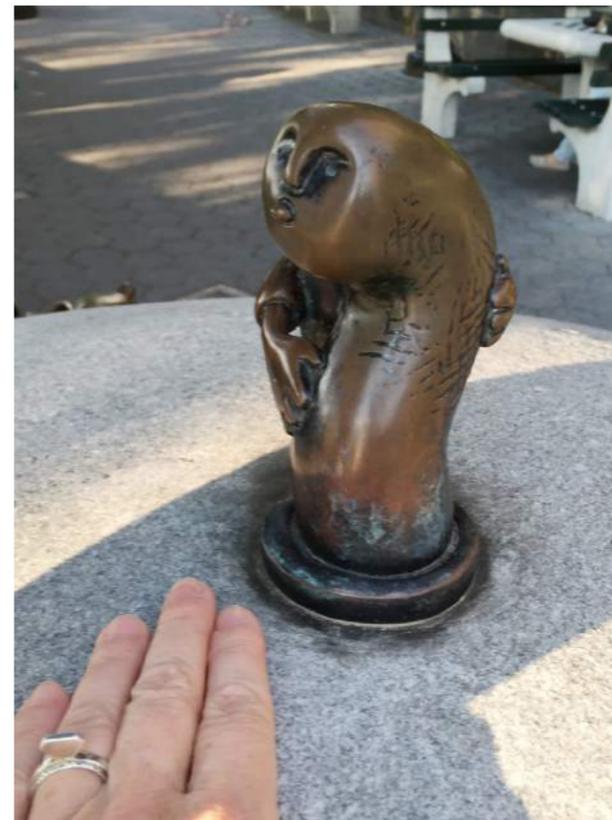
NOTES ON INSTALLATION: Sculptures will be sited to avoid any tripping hazards.

Every effort will be made to post-install sculptures (after construction is finished). However, some sites may require prep to facilitate sculpture installation, in which case(s) coordination with contractor will be necessary.

THE CITY OF AUSTIN
SABINE STREET PUBLIC ART PROJECT
LEGGE LEWIS LEGGE

10/5/2016

Amphibious Installation: Post & Epoxy Attachment Strategy Precedents



Embedded in concrete

Small bronze pieces permanently embedded using post and adhesive in rock, (left) stone (middle) and concrete (right).

Amphibious Installation: Tamper-proof Bolt Attachment Strategies

KEY-REX is not just a tamperproof, vandal-proof, tamper-resistant screw. Key-Rex fasteners are the world's most secure, tamper-proof screws and bolts on the market. Every set of Key-Rex screws and bolts are custom "keyed" for the client. Only the client has the bits to fit their custom set which are designed to be nearly impossible to remove without the bit.

Key-Rex shapes are created using an encryption process that builds a shape out of millions of variables and defines a unique code for each part. Customers pay for a one-time key code tool and licensing agreement.



Driver bits are actually "keys" and only they can remove the Key-Rex fastener.

Like the tumblers of a lock, the unique keyway shape allows only its matched key to fit.

Tamper-Proof Screws & Bolts (Second Only to the Key-Rex)

Penta-Plus is proprietary to Bryce Fastener and configured to keep Torx-Pin, Hex-Pin and other tamper-resistant bits out. Tamper-RESISTANT screws have bits sold on the open market. The higher security Penta-Plus is considered tamper-PROOF because all bits are controlled by Bryce, maintaining its integrity as a high-security fastener.

Without failure, the Penta-Plus has been proven tamper-proof and vandal-proof in the most extreme situations, including securing laptop computers in open kiosks, universities and city government applications. Next to the Key-Rex, these are the most tamper-proof screws and bolts on the market. Adding the Raptor Claw option to the bottom of the Penta-Plus significantly increases the torque and gripping power of this screw over any other on the market except for the Key-Rex.



Also Available: Penta-Nut

The same security and features of the Penta-Plus, available in a nut.



Tamper-proof bolts or spot weld on site.

Upon final site(s) selection, the most economical and logistical anti-theft bolting system will be determined. Small bronze pieces can either be permanently bolted to wooden bench seats with the use of anti-theft bolt systems, or by a tiny spot weld of the bolt to the thread.

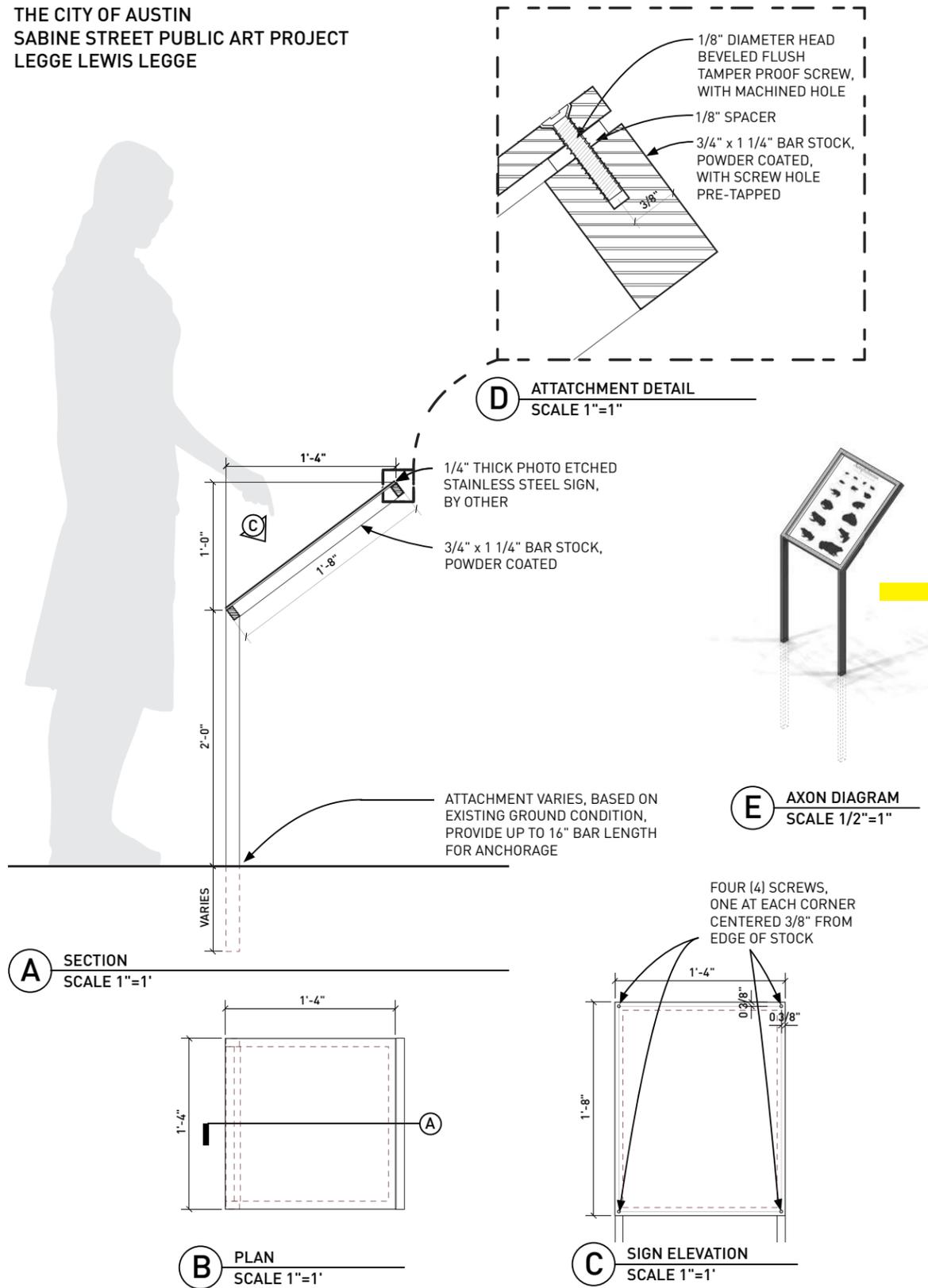


Amphibious Project Plaque

Photo-etched stainless steel project plaque

A simple plaque, situated at 5th and Sabine Streets, shows life-size frog and toad species silhouettes along with common and scientific names. Approx. 30 life-size frog and toad sculptures can be found both in plain view and somewhat hidden throughout the two blocks of Sabine Street between 4th and 6th streets. Visitors can actively search for the bronze creatures, or simply come upon one by surprise on a bench, bollard or wall.

THE CITY OF AUSTIN
SABINE STREET PUBLIC ART PROJECT
LEGGE LEWIS LEGGE



Amphibious Project Plaque

Amphibious



Sabine Street between 4th & 6th Streets, Austin TX
www.austintexas.gov/department/art-in-public-places/amphibious

A link to a pdf with more information on all toad and frog species, as well as each creature's location along the 2 blocks of Sabine Street is located at the bottom of the project plaque.

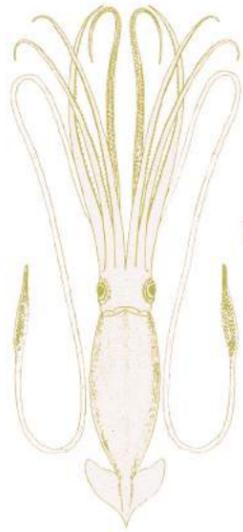
Amphibious



- 1 **Rio Grande Chirping Frog / *Syrnophus caryocarpoides***
 The Rio Grande Chirping Frog is a small frog found in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande.
- 2 **Blanchard's Cricket Frog / *Acris crepitans blanchardi***
 Blanchard's Cricket Frog is a small frog found in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande.
- 3 **Spotted Chorus Frog / *Pseudacris dartii***
 Spotted Chorus Frog is a small frog found in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande.
- 4 **Cliff Chirping Frog / *Syrnophus marmoratus***
 Cliff Chirping Frog is a small frog found in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande.
- 5 **Great Plains Narrowmouth Toad / *Gastrophryne olivacea***
 Great Plains Narrowmouth Toad is a small toad found in the riparian zone of the Rio Grande. It is a common toad in the riparian zone of the Rio Grande. It is a common toad in the riparian zone of the Rio Grande.
- 6 **Strecker's Chorus Frog / *Pseudacris streckeri***
 Strecker's Chorus Frog is a small frog found in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande.
- 7 **Cope's Grey Tree Frog / *Hyla chrysocelis***
 Cope's Grey Tree Frog is a small frog found in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande.
- 8 **Green Tree Frog / *Hyla cinerea***
 Green Tree Frog is a small frog found in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande.
- 9 **Couch's Spadefoot Toad / *Scaphiopus couchii***
 Couch's Spadefoot Toad is a small toad found in the riparian zone of the Rio Grande. It is a common toad in the riparian zone of the Rio Grande. It is a common toad in the riparian zone of the Rio Grande.
- 10 **Texas Toad / *Anaxyrus speciosus***
 Texas Toad is a small toad found in the riparian zone of the Rio Grande. It is a common toad in the riparian zone of the Rio Grande. It is a common toad in the riparian zone of the Rio Grande.
- 11 **Woodhouse's Toad / *Anaxyrus woodhousei***
 Woodhouse's Toad is a small toad found in the riparian zone of the Rio Grande. It is a common toad in the riparian zone of the Rio Grande. It is a common toad in the riparian zone of the Rio Grande.
- 12 **Gulf Coast Toad / *Incilius nebulifer***
 Gulf Coast Toad is a small toad found in the riparian zone of the Rio Grande. It is a common toad in the riparian zone of the Rio Grande. It is a common toad in the riparian zone of the Rio Grande.
- 13 **Rio Grande Leopard Frog / *Lithobates berlandieri***
 Rio Grande Leopard Frog is a small frog found in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande.
- 14 **Southern Leopard Frog / *Lithobates sphenoccephalus***
 Southern Leopard Frog is a small frog found in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande.
- 15 **American Bullfrog / *Lithobates catesbeianus***
 American Bullfrog is a large frog found in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande. It is a common frog in the riparian zone of the Rio Grande.

Amphibious Budget

Item	Quantity	Unit Cost	Item Cost	notes
Artist Fee		20%	\$7560.00	
Travel			\$2400.00	estimate 5 trips to Austin: 3 meetings and 2 install
Prototype production & Samples	6		\$1455.00	
Models (Morgan Reptile Replicas)	13	varies	\$315.87	13 base models for 15 different species per Tom Devitt
3D scanning (LaGuardia Studio)	13	\$30.00	\$390.00	
3D print prep (LaGuardia studio)	15	\$150.00	\$2,250.00	Augmentation of 15 3D models into different but similar species than base model.
* 3D print: Matte Bronze Stainless steel (Shapeways)	1	\$300.00	\$300.00	4" Woodhouse's Toad
* 3D print: Bronze (Shapeways)	1	\$100.00	\$100.00	1.5" Cliff Chirping Frog
* 3D prints: High Resolution Acrylate or Frosted Plastic (depending on size) (Shapeways)	15		\$1,800.00	High detail models going to foundry for casting. See sheet 1: Shapeways Frosted Detail Plastic for foundry
bronze mold making and casting (Stevens Art Foundry)	30		\$5,955.00	See sheet 2: Stevens Art Foundry itemized frog budget
Site attachment hardware / labor	20	\$40.00	\$800.00	some attachment work included in Stevens quote
Install / site prep	32	\$275.00	\$8,800.00	estimate
AMPHIBIOUS Interactive Field Guide & QR code			\$2000.00	estimate <i>Interactive Field Guide in progress</i>
SUB TOTAL			\$34,125.87	<p>* NOTE ON THE BUDGET: Final quotes for 3D printing, whether in metal or high-resolution plastic, are based on volume to the cm³, and only available once final models are uploaded for printing. Estimates here are based on quotes for models which are very close in volume to final planned frog and toad models. Because final quotes are not available until final models are completed, this budget reflects 32 final sculptures with a higher contingency that will most likely allow for 35 final sculptures originally planned.</p>
Contingency	9.72%		\$3,674.13	
TOTAL available budget			\$37,800.00	



legge lewis legge

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